

#### **401 KAR 61:140. Existing by-product coke manufacturing plants.**

NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET  
Department for Environmental Protection  
Division for Air Quality

RELATES TO: KRS 224.20-100, 224.20-110, 224.20-120

STATUTORY AUTHORITY: KRS 224.10-100

NECESSITY AND FUNCTION: KRS 224.10-100 requires the Natural Resources and Environmental Protection Cabinet to prescribe regulations for the prevention, abatement and control of air pollution. This regulation provides for the control of emissions from existing by-product coke manufacturing plants.

##### **Section 1.Applicability.**

The provisions of this regulation are applicable to each affected facility commenced before the classification date defined below.

##### **Section 2.Definitions.**

As used in this regulation all terms not defined herein shall have the meaning given them in 401 KAR 50:010 and 401 KAR 61:005.

- (1) "Affected facility" means a by-product coke oven battery.
- (2) "Classification date" means April 9, 1972.
- (3) "Coke oven battery" means a number of slot-type coking chambers arranged side by side.
- (4) "Charging" means the process of conveying coal and dropping it into a coke oven through the charging holes or ports located on top of the oven.
- (5) "Coking" means the destructive distillation of coal in the absence of oxygen.
- (6) "Coke" means a solid form of carbon resulting from the destructive distillation of coal.
- (7) "Coke oven" means a refractory lined, heated, slot-type chamber in which coke is produced.
- (8) "Chuck door" means the port for the leveling bar.
- (9) "Leveling bar" means a structured steel bar pushed back and forth horizontally through the chuck door and used to eliminate the peaks in the coal charged in the oven.
- (10) "Collecting main" means the horizontal manifold connected to the standpipes used to conduct the volatile materials to the by-products plant.
- (11) "Larry car" means the apparatus used to charge coal into an empty oven. It is also known as a charging car.
- (12) "Pusher machine" means a large apparatus which travels on rails alongside the battery and used to remove doors and push coke from the ovens.
- (13) "Gooseneck" means a short curved cast iron refractory lined pipe that conveys the volatiles from the standpipe to the collector main.
- (14) "Standpipe" means a short vertical refractory lined pipe which conducts volatiles from an oven through the gooseneck to the collector main.
- (15) "Quench" means the process whereby water is used to cool the hot coke.
- (16) "Quenching car" mean an apparatus used to convey hot coke to the quenching tower. It is also known as a wharf car.
- (17) "Charging period" means for larry car charging systems, the period of time commencing when the first hopper gate is opened and ending when the last topside port lid is replaced. The charging period includes the period of time during which the port lid is reopened in order to sweep spilled coal into the oven.
- (18) "Total coke oven doors" means push and coke side doors with the chuck doors considered to be part of the push side doors.

##### **Section 3.Standards for Particulate Matter.**

No person subject to the provisions of this regulation shall cause, suffer or allow particulate matter to be discharged to the atmosphere from each affected

facility or operation of a by-product coke oven battery except as follows:

(1) Coke oven charging. No visible emissions during the charging cycle from the control equipment, the charging ports, the larry cars or the open chuck door, except for an average of twenty-five (25) seconds of any visible emissions (excluding water vapor) per charge, averaged over five (5) consecutive charges.

(2) Battery topside leaks. No more than five (5) percent of the charging ports and ten (10) percent of the standpipes on operating ovens shall be leaking (exhibiting visible emissions except for steam or nonsmoking flame) at any time.

(3) Doors. No visible emission, except nonsmoking flame, from more than ten (10) percent of the total coke oven doors on a battery.

(4) Combustion stack. No visible emission (other than water mist or vapor) shall exceed twenty (20) percent opacity from any coke oven combustion stack.

(5) Pushing. Emissions shall be controlled such that:

(a) No visible emissions, as observed at fifteen (15) second intervals, shall exceed twenty (20) percent opacity from the time the oven door removal has been completed until the hot car is inside the quench tower except for ten (10) percent of the total number of observations recorded.

(b) The emission rate from the control device shall not exceed 0.030 pounds of filterable particulate per ton of coke pushed, averaged over a number of pushes.

(6) Quenching.

(a) No visible emissions, except water vapor or mist, shall exceed an opacity of twenty (20) percent during the quenching operations.

(b) No process water shall be used for quenching and the make-up water shall not contain total dissolved solids concentration in excess of 750 mg/liter.

(c) The quench tower draft shall be adequate to ensure that all visible quenching gases exit through the quench tower baffles.

#### **Section 4. Standard for Sulfur Dioxide.**

Coke oven gas shall not be burned or discharged unless it contains a concentration of sulfur compounds (expressed as sulfur dioxide) as determined by Appendix A of this regulation that will result in emissions of no more than ninety-five (95) pounds of equivalent sulfur dioxide per million cubic feet of coke oven gas produced. Included in this are all sulfur compounds, expressed as sulfur dioxide, emitted from sulfur recovery equipment used to process the sulfur compounds removed from coke oven gas.

#### **Section 5. Test Methods and Procedures.**

(1) Except as provided in 401 KAR 50:045, and subsections (2) and (3) of this section, performance tests used to demonstrate compliance with Sections 3 and 4 of this regulation shall be conducted according to the following methods (filed by reference in 401 KAR 50:015):

(a) Reference Method 9 for combustion stack opacity and pushing operation, except for time averaging and number of observations.

(b) Method 209 C from the Standard Methods for the Evaluation of Water and Wastewater, Fifteenth (15th) Edition, 1980, for determining total dissolved solids in make-up water.

(2) Determination of sulfur in coke oven gas. Cleaned coke oven gas and any Claus plant tail gas shall be sampled for hydrogen sulfide, carbonylsulfide, and carbon disulfide by gas chromatograph separation and flame photometric or thermal conductivity detection. Alternate methods may be approved by the cabinet. Clean gas and tail gas flow shall be measured by in-line continuous orifice, venturi or elbow tap flow meters. Compliance testing shall consist of simultaneous measurement of sweet (clean) coke oven gas and sulfur recovery tail gas concentrations and flows. Four (4) samples per hour shall be acquired for concentration and flows during a four (4) hour test period. Compliance shall be determined from the arithmetic average of the sixteen (16) values calculated by using the formula in Appendix A of this regulation.

(3) Determination of visible emissions during the oven charging period.

(a) Principle. The visible emissions emitted from charging systems and oven ports are to be determined visually by an observer who is familiar with coke

oven battery operations. Observations for five (5) consecutive charges are to be recorded unless the standard is exceeded before the five (5) charges are completed.

(b) Procedure. The observer is to stand such that he has a good view of the oven being charged. Upon observing any visible emission an accumulative stopwatch is started. The watch is stopped when the visible emission stops and is restarted when the visible emission reappears. The observer is to continue this procedure for the entire charging period. Visible emissions may occur simultaneously from several points during a charge; e.g., from around all drop sleeves at the same time. In this case, the visible emissions are timed collectively, not independently. Also, visible emissions may start from one (1) source immediately after another source stops. This will be timed as one (1) continuous visible emission. The following visible emissions are not to be timed:

1. Visible emissions from burning coal spilled on top of the oven or oven lid during charging;

2. Visible emissions that drift from the top of a larry car hopper, but have already been timed as a visible emission from the drop sleeve below the hopper.

(c) Recording charging emissions. The time recorded on the stop watch is the total time that visible emissions were observed during the charge.

(4) Determination of visible emissions from coke oven topside leaks.

(a) Principle. The visible emissions produced from leaking off-take systems, and topside lids are determined visually by an observer who is familiar with coke oven battery operations.

(b) Procedure. The observer shall inspect the coke oven battery by traveling the length of the battery topside at a steady pace, pausing only to make appropriate entries on the inspection report. Travel at a normal walking pace one (1) length of the coke oven battery shall constitute a run taking approximately four (4) minutes (for a seventy (70) oven battery) to complete. In performing a run to determine oven lid leaks, the observer shall walk the centerline of the battery looking far enough ahead (two (2) or four (4) ovens) of his travel to easily see the oven lids. During one (1) run, the observer shall record the number of total visible emissions from oven lids, and during another run the observer shall determine visible emissions from off-take systems, and collection mains, from the battery centerline or an alternative location (e.g. a catwalk). The total number of leaks from the topside shall be recorded on the inspection report sheet. The following emissions shall not be recorded:

1. Visible emissions from lids and standpipe caps that are opened during a decarbonization period (not to exceed three (3) ovens at any one (1) time) or charging period.

2. Steam emissions; this includes steam caused by the vaporization of wet luting material.

(c) Determination of percent topside leaks. The total number of leaks shall be observed during a run and then the percent of charge port and standpipe leaks shall be determined by using the formulas given in Appendix B to this regulation.

(5) Door inspection procedure.

(a) Observation. The inspector shall make his observations of door emissions from a location as close to the battery as safety and visibility conditions permit, but generally outside of the pusher machine or hot car tracks. The inspector may move to a closer observation point to determine the source of an emission. The inspector shall start the inspection procedure with an oven at either end of the battery and on either the push side or the coke side of the battery. The inspector shall observe and record any visible emission from the door. Visible emissions from the sealing edge around the perimeter of a door, or, in the case of the pusher side, from the door and the chuck door will be considered as door emissions. Visible emissions from structural leaks, such as buckstay or lintel leaks, will not be considered as door emissions. The inspector will then move to the adjacent door and check for door emissions in a like manner. The inspector will continue this procedure down the entire length of the battery. If a temporary machine obstruction occurs blocking his view of

a series of ovens, he may bypass those ovens and continue down the remainder of the battery, returning to check the bypassed ovens when he has completed that side of the battery. After the inspector has observed the doors on one (1) side of a battery, he shall then proceed directly to the opposite side of the battery and again start at one (1) end of the battery repeating the same procedure as for the previous side.

(b) Determination of percent leaking doors. The total number of leaking doors shall be observed on both sides of the coke oven battery and then the percent of leaking doors shall be determined using the formula given in Appendix C to this regulation.

(6) Determination of quenching visible emissions. The inspector shall make his observations of quenching emissions from a position where he can observe the quench plume. The inspector observes all emissions from the time the wharf car enters the quench tower until the time it leaves the tower after the quench. The maximum opacity of the plume observed against a contrasting background is recorded. If water vapor or mist is present, the opacity is determined after the water vapor or mist is no longer visible in the plume.

(7) Determination of pushing visible emissions. The inspector shall make his observation from a position where he can observe emissions from the coke oven door and from the hot car as the emissions rise above the collector main. Emissions shall be observed from the time the door removal has been completed until the hot car has entered the quench tower.

#### **Section 6.Compliance Timetable.**

The owner or operator shall have demonstrated compliance with the standard in Section 3(5)(b) of this regulation on or before December 31, 1980. Compliance with the standard in Section 3(2) of this regulation shall be demonstrated on or before December 31, 1982. Compliance with all other provisions of this regulation shall have been demonstrated on or before June 6, 1979.

Effective Date: September 4, 1986

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Original Reg	JUN 29, 1979	JAN 25, 1980	45 FR 6092
		OCT 31, 1980	45 FR 72153
		DEC 24, 1980	45 FR 84999
1st Revision	DEC 09, 1982	DEC 04, 1986	51 FR 43742
2nd Revision	SEP 19, 1986	JAN 08, 1988	53 FR 501
		MAY 04, 1989	54 FR 19169

# APPENDIX A TO 401 KAR 61:140

Formula for determining sulfur compounds (expressed as SO<sub>2</sub>) contained in coke oven gas.

$$\text{Sulfur compounds in coke oven gas} = \frac{C_{\text{swg}} V_{\text{swg}} + C_{\text{tg}} V_{\text{tg}}}{V_{\text{fg}}} \quad \text{Where:}$$

$C_{\text{swg}}$  = the concentration of total reduced sulfur in the sweet gas expressed as SO<sub>2</sub>;

$C_{\text{tg}}$  = the concentration of total reduced sulfur in the tail gas expressed as SO<sub>2</sub>; and

$V_{\text{swg}}, V_{\text{tg}}, V_{\text{fg}}$  = flow rates of sweet gas, tail gas and foul gas, respectively.

APPENDIX B TO 401 KAR 61:140

Formula for determining percent charge port leaks.

$$\text{Percent charge port leaks} = \frac{(\text{total number of charging port leaks observed during run})}{(\text{number of charging ports / oven})} \times 100$$

Formula for determining percent standpipe leaks.

$$\text{Percent standpipe leaks} = \frac{\text{total number of standpipe leaks observed during run}}{\text{number of operating ovens} \times \text{standpipes / oven}} \times 100$$

Visible emissions occurring during the decarbonization period as provided in Section 5(4)(b)1 of this regulation shall not be included in the formulas above.

APPENDIX C TO 401 KAR 61:140

Formula for determining the percent door leaks.

$$\text{Door leaks (\%)} = \frac{(\text{total number of leaking doors observed})}{(2 \times \text{number of operating ovens in the battery})} \times 100$$